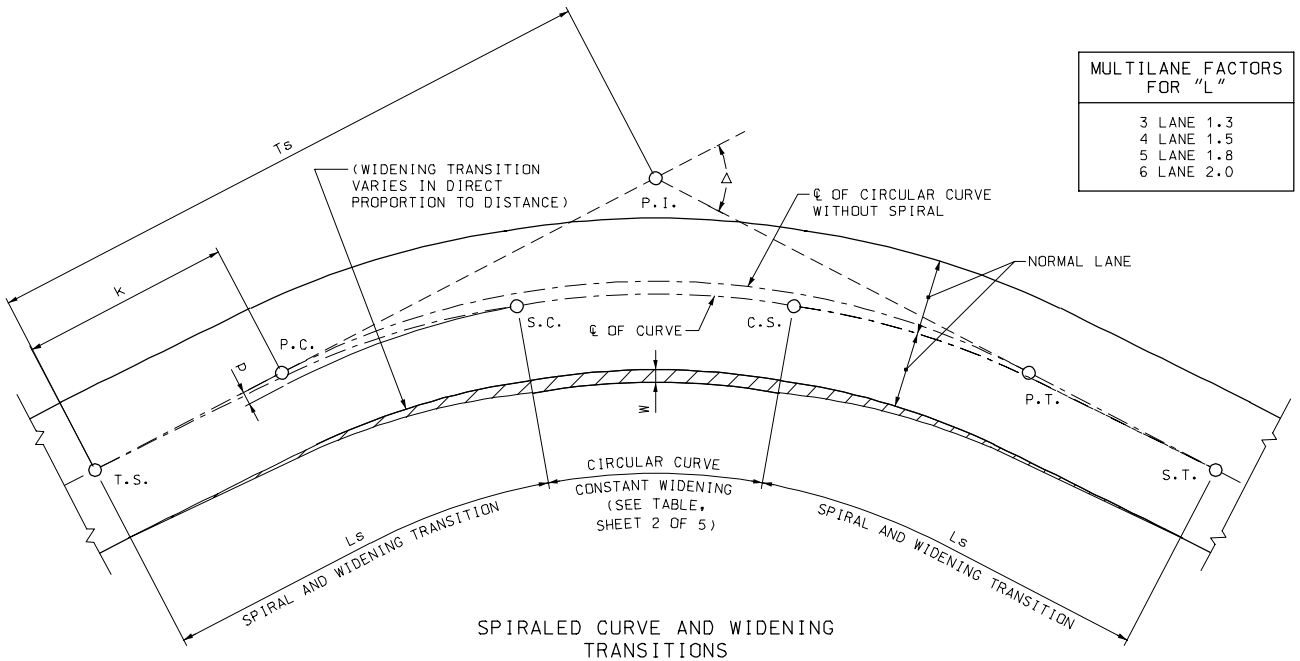
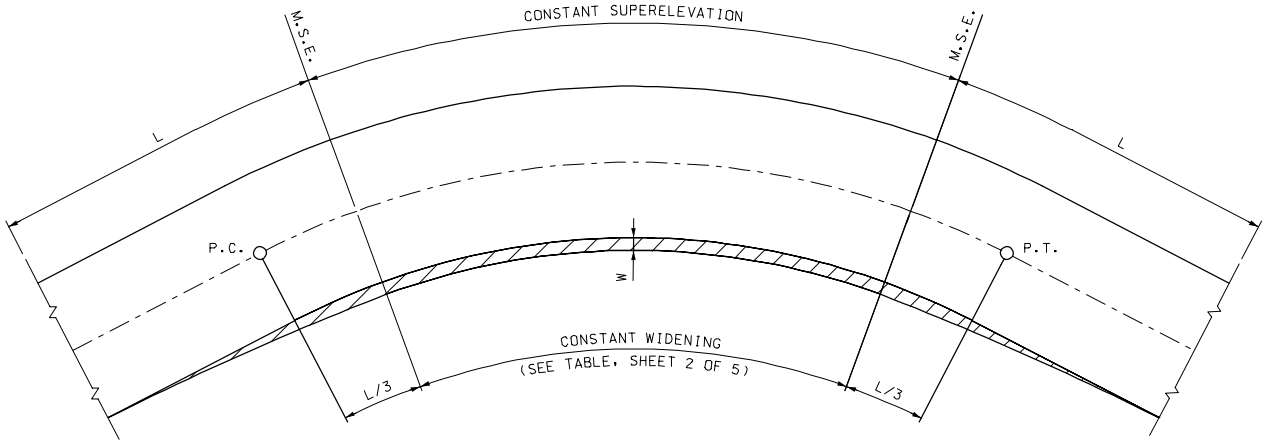
| MULTILANE FACTORS FOR "L" |
|---|
| 3 LANE 1.3 |
| 4 LANE 1.5 |
| 5 LANE 1.8 |
| 6 LANE 2.0 |




SPIRALED CURVE AND WIDENING TRANSITIONS




SUPERELEVATION RUNOUT AND WIDENING TRANSITIONS WITHOUT SPIRALS

SPIRAL NOTES:

1. CURVES WITH A LARGER RADIUS THAN 3000' ARE NOT TO BE SPIRALED.
2. CURVES OF ROADS WITH DESIGN TRAFFIC LESS THAN 400 ADT ARE NOT TO BE SPIRALED.
3. A PRACTICAL CONTROL FOR THE LENGTH OF SPIRAL "Ls" IS CONSIDERED TO BE THE SUPERELEVATION RUNOFF "L".
4. SPIRAL TRANSITION CURVES MAY BE STAKED BY DEFLECTION ANGLES AND CHORDS OR BY OFFSETS FROM TANGENT. THE ARC DEFINITION SHALL BE USED FOR THE CIRCULAR CURVE.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

# SUPERELEVATION, SPIRALS AND WIDENING
(UNDIVIDED HIGHWAYS)

| DATE:_____ | EFFECTIVE: 04-01-2002 | 203.20F | 1/5 |
|---|---|---|---|

## SUPERELEVATION AND WIDENING TABLE, $e_{max}$ = 8%

| DESIGN SPEED | 30 M.P.H. OR LESS | | | | | 40 M.P.H. | | | | | 50 M.P.H. | | | | | 60 M.P.H. | | | | | 70 M.P.H. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NORMAL SURFACE WIDTH | | | 20′ | 22′ | 24′ | | | 20′ | 22′ | 24′ | | | 20′ | 22′ | 24′ | | | 22′ | 24′ | | | 24′ | | |
| RADIUS (FEET) | e% | L | W | | | e% | L | W | | | e% | L | W | | | e% | L | W | | | e% | L | W | |
| 17000 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | | NC | 0 | 0 | |
| 14000 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | | RC | 60 | 0 | |
| 12000 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | | RC | 60 | 0 | |
| 10000 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | RC | 53 | 0 | 0 | | 2.1 | 63 | 0 | |
| 8000 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | 2.1 | 56 | 0 | 0 | | 2.6 | 78 | 0 | |
| 6000 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | RC | 48 | 0 | 0 | 0 | 2.7 | 72 | 0 | 0 | | 3.4 | 102 | 0 | |
| 5000 | NC | 0 | 0 | 0 | 0 | RC | 41 | 0 | 0 | 0 | 2.4 | 58 | 2.0 | 0 | 0 | 3.2 | 85 | 0 | 0 | | 4.1 | 123 | 0 | |
| 4000 | NC | 0 | 0 | 0 | 0 | RC | 41 | 2.0 | 0 | 0 | 2.9 | 70 | 2.0 | 0 | 0 | 3.9 | 104 | 0 | 0 | | 4.9 | 147 | 0 | |
| 3500 | NC | 0 | 0 | 0 | 0 | 2.3 | 48 | 2.0 | 0 | 0 | 3.2 | 77 | 2.0 | 0 | 0 | 4.4 | 117 | 0 | 0 | | 6.5 | 165 | 0 | |
| 3000 | RC | 36 | 2.0 | 0 | 0 | 2.6 | 54 | 2.0 | 0 | 0 | 3.7 | 89 | 2.5 | 0 | 0 | 5.0 | 133 | 0 | 0 | | 6.3 | 189 | 0 | |
| 2500 | RC | 36 | 2.0 | 0 | 0 | 3.0 | 62 | 2.5 | 0 | 0 | 4.3 | 103 | 2.5 | 0 | 0 | 5.7 | 152 | 0 | 0 | | 7.2 | 216 | 0 | |
| 2000 | 2.4 | 44 | 2.5 | 0 | 0 | 3.7 | 77 | 2.5 | 0 | 0 | 5.1 | 122 | 2.5 | 0 | 0 | 6.6 | 176 | 2.0 | 0 | | 7.9 | 237 | 0 | |
| 1800 | 2.6 | 47 | 2.5 | 0 | 0 | 4.0 | 83 | 3.0 | 0 | 0 | 5.5 | 132 | 3.0 | 2.0 | 0 | 7.1 | 189 | 2.0 | 0 | | | | | |
| 1600 | 2.9 | 53 | 2.5 | 0 | 0 | 4.4 | 91 | 3.0 | 0 | 0 | 5.9 | 142 | 3.0 | 2.0 | 0 | 7.5 | 200 | 2.0 | 0 | | | | | |
| 1400 | 3.2 | 58 | 3.0 | 0 | 0 | 4.8 | 99 | 3.0 | 2.0 | 0 | 6.4 | 154 | 3.0 | 2.5 | 0 | 7.8 | 208 | 2.5 | 0 | | | | | |
| 1200 | 3.6 | 65 | 3.0 | 2.0 | 0 | 5.4 | 112 | 3.5 | 2.5 | 0 | 7.0 | 168 | 3.5 | 2.5 | 0 | | | | | | | | | |
| 1000 | 4.2 | 76 | 3.5 | 2.5 | 0 | 6.0 | 124 | 3.5 | 2.5 | 0 | 7.6 | 182 | 3.5 | 3.0 | 2.0 | | | | | | | | | |
| 900 | 4.5 | 82 | 3.5 | 2.5 | 0 | 6.4 | 132 | 4.0 | 3.0 | 2.0 | 7.8 | 187 | 4.0 | 3.5 | 2.5 | | | | | | | | | |
| 800 | 4.9 | 89 | 4.0 | 3.0 | 2.0 | 6.8 | 141 | 4.0 | 3.0 | 2.0 | 8.0 | 192 | 4.5 | 3.5 | 2.5 | | | | | | | | | |
| 700 | 5.3 | 96 | 4.0 | 3.0 | 2.0 | 7.2 | 149 | 4.5 | 3.5 | 2.5 | | | | | | | | | | | | | | |
| 600 | 5.8 | 105 | 4.5 | 3.5 | 2.5 | 7.6 | 157 | 5.0 | 4.0 | 3.0 | | | | | | | | | | | | | | |
| 500 | 6.4 | 116 | 5.5 | 4.5 | 3.5 | 8.0 | 165 | 5.5 | 4.5 | 3.5 | | | | | | | | | | | | | | |
| 450 | 6.7 | 122 | 5.5 | 4.5 | 3.5 | | | | | | | | | | | | | | | | | | | |
| 400 | 7.1 | 129 | 6.0 | 5.0 | 4.0 | | | | | | | | | | | | | | | | | | | |
| 350 | 7.5 | 136 | 7.0 | 6.0 | 5.0 | | | | | | | | | | | | | | | | | | | |
| 300 | 7.8 | 142 | 7.5 | 6.5 | 5.5 | | | | | | | | | | | | | | | | | | | |
| 250 | 8.0 | 145 | 9.0 | 8.0 | 7.0 | | | | | | | | | | | | | | | | | | | |

MIN. RADIUS = 250′

MIN. RADIUS = 465′

MIN. RADIUS = 750′

MIN. RADIUS = 1205′

MIN. RADIUS = 1820′

## SUPERELEVATION AND WIDENING TABLE, $e_{max}$ = 4%

| DESIGN SPEED | 30 M.P.H. OR LESS | | | | | 40 M.P.H. | | | | | 50 M.P.H. | | | | | 60 M.P.H. | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NORMAL SURFACE WIDTH | | | 20′ | 22′ | 24′ | | | 20′ | 22′ | 24′ | | | 20′ | 22′ | 24′ | | | 22′ | 24′ | |
| RADIUS (FEET) | e% | L | W | | | e% | L | W | | | e% | L | W | | | e% | L | W | | |
| 10000 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | |
| 8000 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | RC | 53 | 0 | 0 | |
| 6000 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | RC | 48 | 0 | 0 | 0 | 2.3 | 61 | 0 | 0 | |
| 5000 | NC | 0 | 0 | 0 | 0 | NC | 0 | 0 | 0 | 0 | RC | 48 | 2.0 | 0 | 0 | 2.5 | 67 | 0 | 0 | |
| 4000 | NC | 0 | 0 | 0 | 0 | RC | 41 | 2.0 | 0 | 0 | 2.3 | 55 | 2.0 | 0 | 0 | 2.8 | 75 | 0 | 0 | |
| 3500 | NC | 0 | 0 | 0 | 0 | RC | 41 | 2.0 | 0 | 0 | 2.5 | 60 | 2.0 | 0 | 0 | 3.0 | 80 | 0 | 0 | |
| 3000 | NC | 0 | 2.0 | 0 | 0 | 2.1 | 43 | 2.0 | 0 | 0 | 2.7 | 65 | 2.5 | 0 | 0 | 3.3 | 88 | 0 | 0 | |
| 2500 | RC | 36 | 2.0 | 0 | 0 | 2.4 | 50 | 2.5 | 0 | 0 | 2.9 | 70 | 2.5 | 0 | 0 | 3.5 | 93 | 0 | 0 | |
| 2000 | RC | 36 | 2.0 | 0 | 0 | 2.6 | 54 | 2.5 | 0 | 0 | 3.2 | 77 | 2.5 | 0 | 0 | 3.8 | 101 | 2.0 | 0 | |
| 1800 | 2.1 | 38 | 2.5 | 0 | 0 | 2.7 | 56 | 3.0 | 0 | 0 | 2.3 | 79 | 3.0 | 2.0 | 0 | 3.9 | 104 | 2.0 | 0 | |
| 1600 | 2.2 | 40 | 2.5 | 0 | 0 | 2.9 | 60 | 3.0 | 0 | 0 | 3.5 | 84 | 3.0 | 2.0 | 0 | 4.0 | 107 | 2.5 | 0 | |
| 1400 | 2.4 | 44 | 2.5 | 0 | 0 | 3.0 | 62 | 3.0 | 2.0 | 0 | 3.7 | 89 | 3.0 | 2.5 | 0 | | | | | |
| 1200 | 2.5 | 45 | 3.0 | 2.0 | 0 | 3.2 | 66 | 3.5 | 2.5 | 0 | 3.9 | 94 | 3.5 | 2.5 | 0 | | | | | |
| 1000 | 2.7 | 49 | 3.5 | 2.5 | 0 | 3.5 | 72 | 3.5 | 2.5 | 0 | 4.0 | 96 | 3.5 | 3.0 | 2.0 | | | | | |
| 900 | 2.9 | 53 | 3.5 | 2.5 | 0 | 3.6 | 74 | 4.0 | 3.0 | 2.0 | | | | | | | | | | |
| 800 | 3.0 | 55 | 4.0 | 3.0 | 0 | 3.8 | 79 | 4.0 | 3.0 | 2.0 | | | | | | | | | | |
| 700 | 3.2 | 58 | 4.0 | 3.0 | 2.0 | 3.9 | 81 | 4.5 | 3.5 | 2.5 | | | | | | | | | | |
| 600 | 3.4 | 62 | 4.5 | 3.5 | 2.5 | 4.0 | 83 | 5.0 | 4.0 | 3.0 | | | | | | | | | | |
| 500 | 3.6 | 65 | 5.5 | 4.5 | 3.5 | | | | | | | | | | | | | | | |
| 450 | 3.7 | 67 | 5.5 | 4.5 | 3.5 | | | | | | | | | | | | | | | |
| 400 | 3.8 | 69 | 6.0 | 5.0 | 4.0 | | | | | | | | | | | | | | | |
| 350 | 3.9 | 71 | 7.0 | 6.0 | 5.0 | | | | | | | | | | | | | | | |
| 300 | 4.0 | 73 | 7.5 | 6.5 | 5.5 | | | | | | | | | | | | | | | |

MIN. RADIUS = 300′

MIN. RADIUS = 565′

MIN. RADIUS = 930′

MIN. RADIUS = 1505′

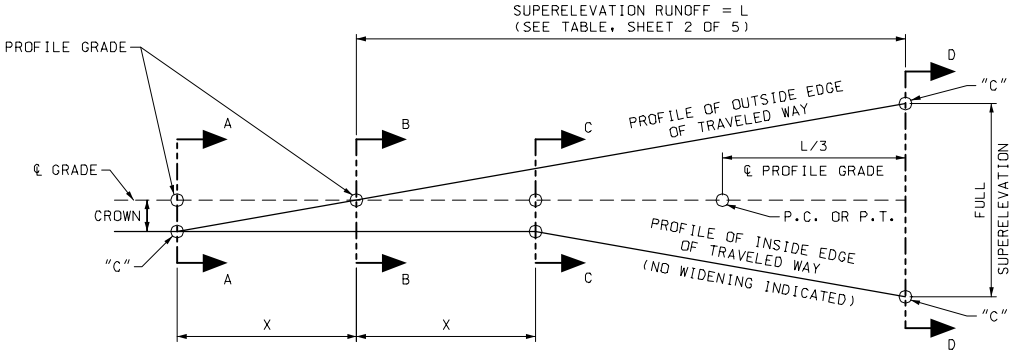
TABLE NOTES:

1) "NC" DENOTES NORMAL CROSS SLOPE.
2) "RC" DENOTES REMOVE ADVERSE CROSS SLOPE. SUPERELEVATE AT NORMAL CROSS SLOPE.
3) "e" DENOTES THE SUPERELEVATION IN PERCENT (%).
4) "L" THE LENGTH OF SUPERELEVATION RUNOFF AND WIDENING TRANSITION IN FEET FOR A 2 LANE ROADWAY.
5) "W" THE WIDENING IN FEET FOR SURFACING AT INSIDE SHOULDERS.
6) VALUE FOR A RADIUS NOT SHOWN IN ABOVE TABLE SHALL BE IDENTICAL TO THOSE FOR THE NEAREST TABULATED RADIUS. IN CASE OF TIE, USE VALUES OF NEXT LARGER RADIUS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

# SUPERELEVATION, SPIRALS AND WIDENING
(UNDIVIDED HIGHWAYS)

DATE:_____ | EFFECTIVE: 04-01-2002 | 203.20F | 2/5

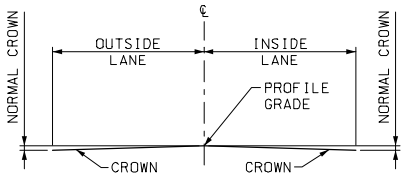



A–A TO B–B IS THE TANGENT RUNOUT.

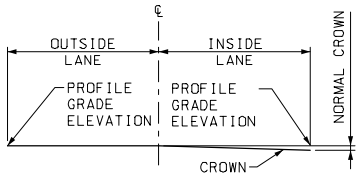
$$X = \frac{L \times NC(\%)}{e(\%)}$$

NOTE:

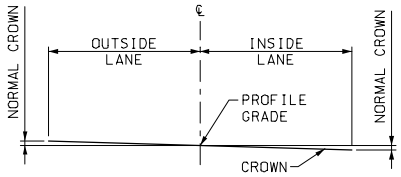
SHORT VERTICAL CURVES MAY BE INSERTED AT POINTS "C" BY EYE ADJUSTMENTS OF STAKES OR FORMS IN THE FIELD.



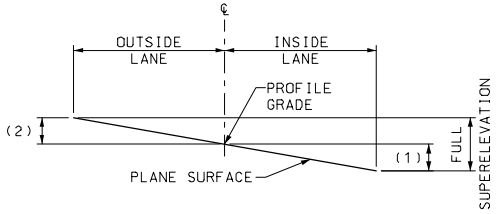

SECTION A–A




SECTION B–B




SECTION C–C




(1) FULL S.E. FOR ½ PAVEMENT WIDTH IF GREATER THAN CROWN SLOPE.

(2) FULL S.E. FOR ½ PAVEMENT WIDTH.

SECTION D–D

## CASE NUMBER 1

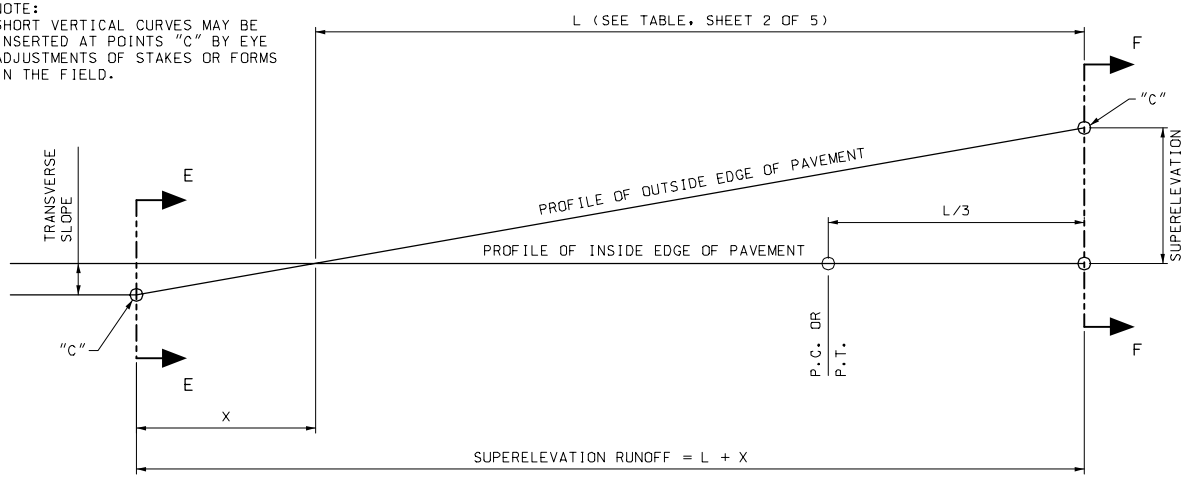
(WHERE HIGH POINT OF TRAVELED WAY IS AT CENTERLINE ON TANGENT SECTION)
NOTE: USE FOR 2 LANE TRAFFIC ROADS ONLY. PAVEMENT REVOLVED ABOUT ITS ℄.

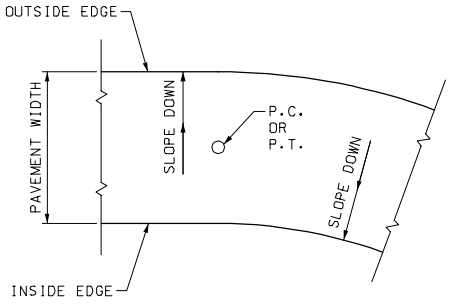
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

SUPERELEVATION, SPIRALS AND WIDENING
(UNDIVIDED HIGHWAYS)

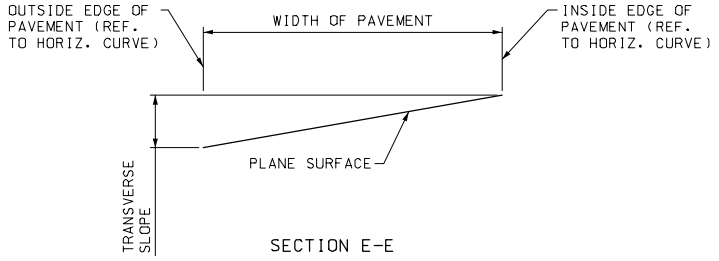
DATE:_____ | EFFECTIVE: 04-01-2002 | 203.20F | 3/5

NOTE:
SHORT VERTICAL CURVES MAY BE INSERTED AT POINTS "C" BY EYE ADJUSTMENTS OF STAKES OR FORMS IN THE FIELD.

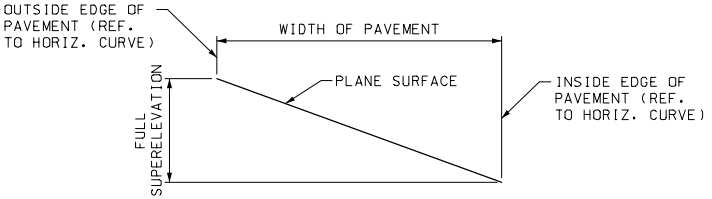



PLAN OF ALIGNMENT
FOR CASE NUMBER 2




SECTION E-E




SECTION F-F

CASE NUMBER 2

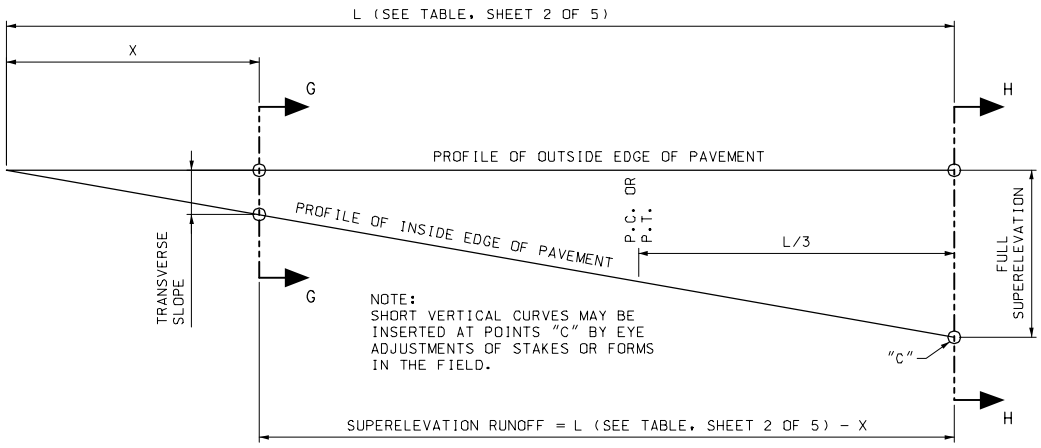
(WHERE TRANSVERSE SLOPE ON TANGENT SECTION IS OPPOSITE TO SLOPE OF SUPERELEVATION)
NOTE: PAVEMENT REVOLVED ABOUT ITS INSIDE EDGE WITH REFERENCE TO THE HORIZONTAL CURVE WHICH IS BEING APPROACHED.

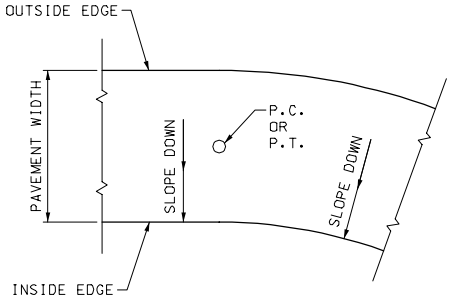
STRAIGHT LINE METHODS OF ATTAINING SUPERELEVATION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

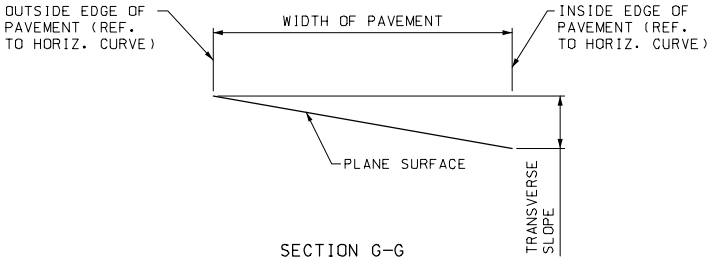
SUPERELEVATION, SPIRALS AND WIDENING
(UNDIVIDED HIGHWAYS)

DATE:_____ | EFFECTIVE: 04-01-2002 | 203.20F | 4/5

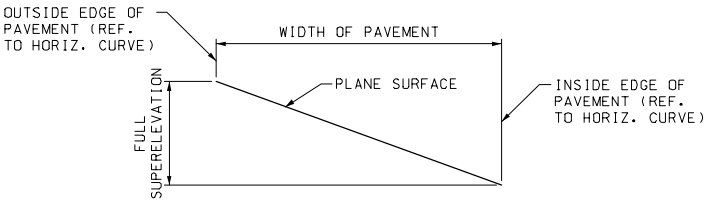



PLAN OF ALIGNMENT
FOR CASE NUMBER 3




SECTION G-G




SECTION H-H

## CASE NUMBER 3

(WHERE TRANSVERSE SLOPE ON TANGENT SECTION IS SAME DIRECTION AS SLOPE OF SUPERELEVATION)
NOTE: PAVEMENT REVOLVED ABOUT ITS OUTSIDE EDGE WITH REFERENCE TO THE HORIZONTAL CURVE WHICH IS BEING APPROACHED.

## STRAIGHT LINE METHOD OF ATTAINING SUPERELEVATION

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

SUPERELEVATION, SPIRALS AND WIDENING
(UNDIVIDED HIGHWAYS)

DATE:_____ | EFFECTIVE: 04-01-2002 | 203.20F | 5/5